

REMARKS

The Examiner is thanked for the careful review of the application as set forth in the outstanding office action. Reconsideration of the application in view of the foregoing amendments and the following discussion is respectfully requested.

Claims Rejections 35 USC 103

Claims 17-26 stand rejected as being unpatentable over Wilson et al. ("Wilson") in view of Calaman et al. ("Calaman") and Nakahama et al. ("Nakahama"). This ground of rejection is respectfully traversed on the grounds that a *prima facie* case of obviousness has not been established, and the applied references do not teach or suggest the claimed subject matter.

Claim 17 is drawn to a heat exchanger, comprising:

a generally planar finstock layer comprising an array of heat exchanging finstock conduits, each conduit having an inlet and an outlet;

a generally planar manifold layer including a plurality of inlet plenums for providing heat exchanging fluid to the inputs of the heat exchanging conduits, and a plurality of outlet plenums for receiving heat exchanging fluid from the outputs of the heat exchanging conduits, and wherein the inlet plenums and outlet plenums are in fluid communication only through said heat exchanging conduits; and

a generally planar faceplate layer having a heat input side, the finstock layer being sandwiched between said manifold layer and said faceplate layer.

The Examiner contends that Wilson and Calaman disclose a heat exchanger having the claimed structure with the exception of a planar manifold layer, and that Nakahama teaches the use of a manifold layer (Fig. 4A) to provide cooling fluid to an array of cooling areas in a heat

exchanger. The Examiner holds that it "would have been obvious in view of Nakahama to provide a manifold layer in the heat exchangers of Wilson to enable coolant to the array without the use of a plurality of tubes, the motivation being to make the device easier to assemble and to reduce the risk of coolant leakage." Applicants respectfully disagree with these contentions and holdings.

Wilson describes fluid cooling systems with one or more heat exchangers, for cooling circuit chips mounted on substrates, through which a liquid coolant is circulated. Each heat exchanger has a flexible wall and is mounted so that its flexible wall is in close proximity to a surface of the substrate to be cooled. A low thermal impedance contact is made through the flexible wall between the substrate and the coolant. The heat exchangers are connected into the cooling system through flexible conduits so that a heat exchanger can readily be moved out of contact with a substrate without disrupting the flow of coolant through the cooling system. See Abstract.

Wilson does not disclose a generally planar finstock layer as recited in Claim 17, nor a generally planar manifold layer as recited in Claim 17, nor a generally planar faceplate layer which, with a manifold layer, sandwiches the finstock layer.

Calaman describes a liquid cooled heater exchanger having a cooling housing including a peripheral side wall extending from the perimeter of a bottom wall and a lid sized to engage the side wall so as to form a chamber. A fluid inlet port and a fluid outlet port are defined through the lid. In the embodiment of FIGS. 6-8, a corrugated fin having a plurality of corrugations is positioned within the chamber so that at least one of the corrugations engages the bottom wall and at least one of the corrugations engages the underside of the lid. See Abstract, and 4:47 to 5:15.

Nakahama describes a cooling device for heat generating elements, wherein coolant is introduced into a coolant introduction chamber with the back face side of heat generating elements within a first coolant contact chamber by

injection from a central nozzle. Thereafter, coolant produces a cooling effect in a second coolant contact chamber and a third coolant contact chamber. Peripheral nozzles are formed so as to spread in radial fashion about the central nozzle, to effect cooling to practically the same temperature.

The Examiner alleges that it would have been obvious to provide a manifold layer in the heat exchangers of Wilson to enable providing coolant to the array without the use of a plurality of tubes, the motivation being to make the device easier to assemble and to reduce the risk of coolant leakage. Applicants respectfully disagree.

First of all, the Examiner does not explain how the Wilson array could be modified to include a radial coolant dispersal structure as in Nakahama to replace the plurality of tubes. Second, eliminating the plurality of tubes in the Wilson array would change a principle of operation of the Wilson cooling system, since the heat exchangers in Wilson are connected into the cooling system through flexible conduits so that a heat exchanger can be readily moved out of contact with a substrate without disrupting the flow of coolant through the cooling system. Third, incorporation of a corrugated fin as disclosed by Calaman into a heat exchanger of Wilson, with the fin crests attached to the bottom 20 and the lid 30, would change another principle of operation of Wilson. Wilson teaches use of a flexible wall between the coolant and the substrate to be cooled, which allows the pressure of the coolant to force the flexible wall into good mechanical contact with the substrate. This feature would be rendered unusable if a corrugated fin were attached to the flexible wall, since the fin would rigidify the wall. The teachings of Wilson and Nakahama are not sufficient to render the claims *prima facie* obvious. MPEP 2143.01 ("If the proposed modification or combination of references would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.")

As the Federal Circuit has recognized, most if not all inventions are combinations and mostly of old elements, and so an examiner can often find each element of a claimed invention in the prior art. Of course, if identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would issue. Rejecting patents solely by finding corollaries of the claimed elements in the prior art would permit an examiner to use the claimed invention as a blueprint for piecing together elements in the prior to defeat patentability. To prevent the use of hindsight based on the invention to defeat patentability, the examiner is required to show a motivation to combine the references used to create the case of obviousness. Thus, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed. *In re Rouffet*, 47 USPQ 2d 1453, 1458 (Fed. Cir. 1998). Evidence of a suggestion, teaching or motivation may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or in some cases, from the nature of the problem to be solved. The range of sources available, however, does not diminish the requirement for actual evidence. The showing of such actual evidence must be clear and particular. Broad conclusory statements regarding the teaching of multiple references, standing alone, are not evidence. The required showing of evidence should include particular factual findings. *In re Dembiczak*, 50 USPQ 2d 1614, 1617 (Fed.Cir. 1999)

Applicants respectfully submit that the line of reasoning propounded by the Examiner in support of the rejection does not establish *prima facie* the obviousness of applicants' invention. Particularly, there is no teaching, suggestion or motivation to combine the references to arrive at the claimed subject matter. The rejection of Claim 17 should be withdrawn.

The rejection of Claims 18-26, depending from Claim 17, should also be withdrawn for reasons just discussed above regarding Claim 17. Moreover, these claims add additional distinguishing features. For example, Claim 23

recites that the heat exchanging conduits comprise finstock elements having a fin density of at least about 50 fins per inch. The Examiner did address similar limitations in Claim 12, discussed below. The Examiner held that while Calaman does not disclose the number fins per inch, "it would have been obvious to one of ordinary skill in the art to use any suitable number of fins per inch as determined by routine design considerations." As pointed out below, this assertion is unsubstantiated, and does not form a proper basis for an obviousness rejection. Providing a finstock density of at least about 50 fins per inch in a heat exchanger as recited in Claim 23 is a significant technical achievement. Moreover, use of a fin density as recited in Claim 23 may provide relatively higher pressure drop in the finstock layer for a desired flow distribution of the entire heat exchanger; see paragraph 22 of applicants' specification, for example. The Examiner is respectfully requested to provide a reference citation or an affidavit providing proper evidentiary support for rejection of Claim 23. MPEP 2144.03

A further reason that the rejection of Claims 18-26 should be withdrawn is that the outstanding office does not specifically address the features of these dependent claims. For this reason alone, a prima facie case of obviousness has not been established.

Claims 9, 10 and 12 stand rejected as being unpatentable over Wilson in view of Calaman. Applicants respectfully submit that a prima facie case of obviousness has not been established regarding these claims. Claim 9 has been canceled in view of the amendments to Claim 1.

Wilson and Calaman have been discussed above. The Examiner alleges that Calaman discloses "the use of multipass finstock elements (57 in Fig. 6) in an heat exchanger" and it would have been obvious in view of Calaman to use multipass finstock elements in the heat exchangers of Wilson et al. to increase the turbulence and thus increase the heat transfer." The Examiner also holds that while Calaman does not disclose the number fins

per inch, "it would have been obvious to one of ordinary skill in the art to use any suitable number of fins per inch as determined by routine design considerations." Applicants respectfully disagree with the Examiner's contentions.

Calaman does not disclose multiplass finstock elements; element 57 is a single pass structure. Moreover, regarding limitations of Claim 12, for example, that the heat exchanging conduits comprise finstock elements of at least about 50 fins per inch, the rejection based on "routine design considerations" amounts to speculation, and is not a proper support for an obviousness rejection. See In re Rijckaert, 28 USPQ 2d 1955, 1957 (Fed. Cir. 1993). If the Examiner maintains the rejection, applicants respectfully request that the Examiner cite specific references which teach or suggest the obviousness of the features of the dependent claims. MPEP 2144.03

Claims Rejections - 35 USC 102

Claims 1-8, 11 and 13-16 stand rejected as being anticipated by Wilson. This ground of rejection has been mooted by the foregoing amendments to Claim 1.

Claim 1 as amended includes:

a two-dimensional array of heat exchanging core element finstock conduits, each core element conduit providing for a multiple pass flow of heat exchanging fluid flowing therein, each core element conduit comprising a plurality of finstock legs that are serially, fluidically interconnected by turning plenums

None of the references describe or suggest a heat exchanger as recited in Claim 1, with such a two-dimensional array. Withdrawal of the rejection of Claim 1, as well as all claims depending therefrom, is respectfully requested.

The rejection of Claims 2, 13, 14 and 16 should further be withdrawn because the features of these claims are not addressed in the office action,

and for that reason alone, a prima facie case of anticipation has not been established.

CONCLUSION

The outstanding rejections have been addressed, and the application is in condition for allowance. Such favorable reconsideration is solicited.

Respectfully submitted,



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